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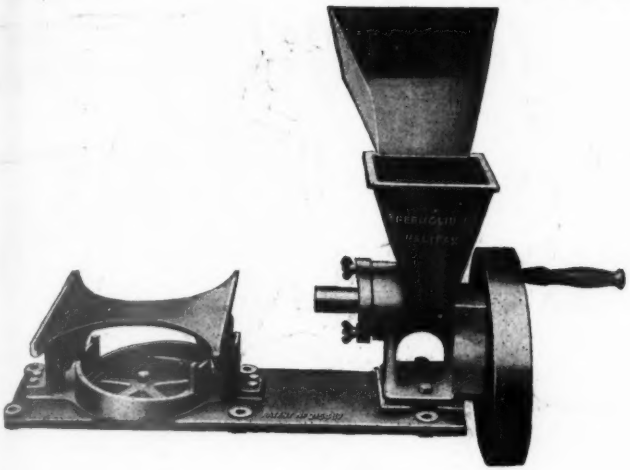

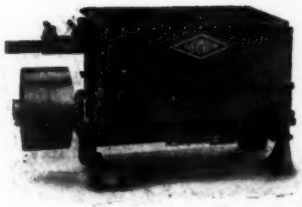

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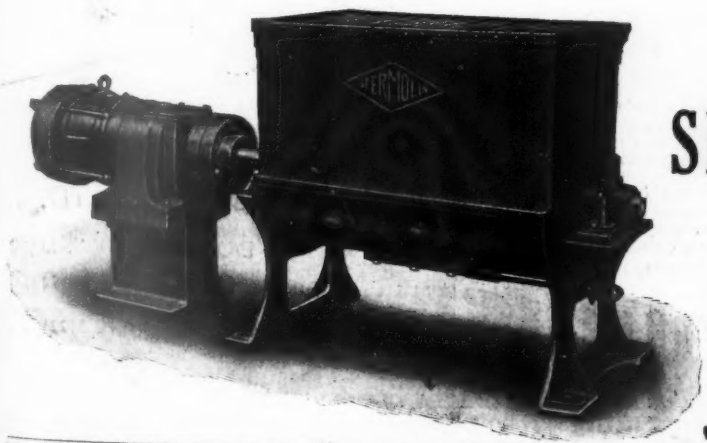

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Vol. 70 Thursday, June 17, 1943 No. 1400

Surface Finish

Fifty years ago metallurgical analysis was in its infancy, and we can well imagine that before its real value was appreciated it was looked upon with doubt and suspicion. Besides analysis we have seen the pyrometer, the metallurgical microscope, radiography and many other testing and measuring instruments win honourable places for themselves as works' helps, and unless our life is cut unduly short, we rather think we shall live to see the day when the surfaces of castings both before and after machining, the surfaces of moulds and fractured surfaces will be described not merely by the use of a selection of adjectives, but both qualitatively and quantitatively.

At present, the situation is most unsatisfactory. If one technician wishes to indicate to another technician how rough or how smooth a surface is or should be, he has no means of doing so other than by a reference to the method of production and the use of some such qualifying adjective as "fine," "rough," or the like. In fact, the same difficulty confronts some of our friends who are rock climbing enthusiasts. They can say how high are the rocks they climb and how many miles away from the nearest place of refreshment, but their only means of conveying any idea of the roughness of Millstone Grit or the smoothness of limestone is by the use of numerous and, usually, unprintable adjectives.

The quality of a surface is often of the utmost importance for the correct functioning of a finished machine part, nevertheless it is only recently that means have been devised to measure such roughness and to give it a figure. Some seven years ago a comprehensive work dealing with the measurement of surface roughness, or surface topography as some people prefer to call it, was published in Germany. Since then little further work has come from that country, but much good work has been done both in this country and in the United States of America. It is an open secret that the British Standards Institution with their usual foresight have been working on a specification for some time, and it is to be hoped that it will soon be published.

A short time ago (May 21, 1943) a Paper on "Surface Finish and the Function of Parts," by Dr. Schlesinger, was presented to the Institution of Mechanical Engineers. There was a large attendance of members, and the discussion lasted for very nearly two hours. In general, Dr. Schlesinger dealt with surfaces having a very fine, high class finish, but the measurement of surface finish is, of course, not restricted to the measurement of finely finished surfaces. It is just as important to be able to specify the finish given to the face of one of the cast-iron segments which go to build up our underground system as it is to specify the finish on one of the more delicate pieces of an aeroplane accessory.

In our early days any suggestion of a new means of measuring or testing was usually looked upon as a menace to production, but we do not think that anyone will look upon these methods for measuring surface in that light.

It will be advantageous to everyone when roughness can be specified. We understand there are many different methods for determining surface roughness, each of which has its own particular field of usefulness, and in this issue we are publishing an article dealing with one method that will probably cover all foundry requirements right from the mould to the machined casting.

The author, Mr. Kayser, is a member of the London branch of the Institute of British Foundrymen, and was formerly for many years a member of the Sheffield branch. We are sure that if any foundrymen are in any doubt or have any difficulties about the measurement of surface roughness he will only be too glad to give any help possible.

Contents

Surface Finish, 127.—Compensation for Government Requisition and Acquisition, 128.—Supplies and Prices of Tin, 128.—Pearlitic Malleable Cast Iron, 129.—Improving Steel-foundry Operations, 135.—Infra-Red Lamp Heating, 136.—Optical Cut Method for the Determination of Surface Roughness, 137.—The Future of Aluminium, 139.—Birthday Honours, 140.—Obituary, 140.—News in Brief, 142.—Cast-iron Scrap in Eire, 142.—Company News, 144.—New Companies, 144.—Raw Material Markets, 146.

COMPENSATION FOR GOVERNMENT REQUISITION AND ACQUISITION

Many implications having arisen from the Compensation (Defence) Act, 1939, this explanation is given as little reference was possible at its passing. This statute concerns the compensation payable where premises, goods or vehicles are taken over by Government departments.

Goods.—For ordinary goods, the price paid a producer or manufacturer is the production costs plus usual profit, for a trader not a producer the cost price plus the usual profit applies. For anyone else the compensation payment is the amount which might be expected to be obtained for the goods (consideration being given to the condition of the goods); for ordinary folk not traders, no account is to be taken of any profit which might be likely to be made on a sale of the goods. If the goods are price controlled by law or there are maximum prices fixed, then the above provisions do not allow a departure from those prices.

Vehicles, Aircraft, Vessels.—The compensation payable where a vehicle is requisitioned is a sum which would be ordinarily payable by a person for the use of or hire of the vehicle, he being responsible for the cost of insurance and maintenance, and for running costs. If the vehicle is worked for the authority by the owner, an additional sum is payable. Any damage above fair wear and tear is payable and if there is a total loss while the vehicle is requisitioned, the value as at the time of the damage is payable. The amount payable where the vehicle is acquired is the value immediately before the acquisition and no account is to be taken of anything payable for hire, etc., or for making good any exceptional damage, as mentioned earlier.

Property.—Where premises are taken over the rent payable is an amount which ordinarily would be payable in the district in question by a tenant at the relevant date, with the tenant responsible for tenant's rates and taxes, for repairs, insurance and so forth. If damage beyond reasonable wear and tear is done to the property, this is paid for by the authority.

Suppose certain things are done to the property (such as the erection of buildings, etc., or demolition, pulling down or destruction of anything on the property has taken place or things removed, etc.) which diminishes the annual value (*i.e.*, letting value) of the property, compensation is payable, being a sum equal to what is considered the depreciation. Of course the authority may undertake to make the property as far as possible the same as before the taking over, in which case compensation would be paid (by instalments) equal to the diminution in the annual value, until the premises are restored to the former condition.

Particular Points.—For goods, vehicles, etc., or property, the Act provides that no account is to be taken of any appreciation in values, considered as due to the war. Whether the case concerns goods, vehicles, etc., or property, a sum in addition to the sums mentioned above is payable for expenses reasonably in-

(*Concluded in next column.*)

SUPPLIES AND PRICES OF TIN

Discussing the future position in the light of wartime events, the Tin Producers' Association, in their organ, "Tin," urge that the industry should not concern itself at present with the probable post-war price, but should concentrate on development and research. At the same time, the purely technical aspects of the problem must not blind the industry to the commercial aspects in devising ways and means for restarting the tin mines in Malaya, Siam, Burma, the Dutch East Indies and French Indo-China on the most up-to-date lines.

The buffer stock price range before the war was from £200 to £230 per ton, and had the object of ensuring that a price should be maintained at which every commercial deposit of tin—in whatever country—could be worked at a reasonable profit. Pointing out that it has become commonplace to think of production in Malaya costing £40 or so per ton, the article says that it is not generally realised that this would represent the bare mining cost of a ton of 75 per cent. concentrate; it is considerably below the average and does not include royalty, transport and smelting charges nor provision for depreciation or amortisation. The price range of £200 to £230 per ton was not over-generous to the Malayan tin-mining industry, but the margin was better than in Bolivia or Cornwall.

Development and Research

At present, tin, like all other raw materials, is in short supply, at any rate for normal industrial purposes. When anything is in short supply there is always a tendency for quality to depreciate because of substitution. This aspect of the situation, it is urged, needs the industry's most careful attention. Intensive development and research in all branches of the industry is vital from this moment through to the changeover from wartime to peacetime production and then onwards during the period of control of all commodities which may follow the war. Tin is used in small quantities in many manufactures; each one of these manufactures contains other raw materials: most of those raw materials are in short supply and will have to be rationed and controlled after the war—for instance, steel for tinplates for canning, alloys for bearings for internal-combustion engines. It is clear that the rate of consumption of any one raw material after the war will be dependent upon the rate of supply of many other materials. This interrelation of the raw materials is a vital fact which should be grasped at once by the tin industry.

(*Concluded from previous column.*)

curred in complying with any directions given under the Act, as for instance, incidental expenses incurred in the transfer, carriage and transport expenses, etc. If machinery, fittings or fixtures and the like are required to be moved, the cost of removing and storing (or setting up in alternative premises) is allowed. If the machinery, etc., is stored and afterwards a return is made to the original premises, the cost of setting up in those premises is allowed.

PEARLITIC MALLEABLE CAST IRONS

Mechanism of graphitisation, annealing cycles, heat-treatment and effect of gases and alloys on graphitisation and physical properties

By A. E. PEACE

(Concluded from page 114)

Use of Alloys

The arresting of second stage graphitisation can, however, be effected by the use of alloying elements. Those which are suitable are naturally the ones which retard graphitisation. Fortunately the retarding elements generally affect second stage graphitisation more markedly than first stage graphitisation, so that it is possible to obtain equilibrium at the maximum temperature whilst preventing the attainment of equilibrium conditions during cooling through or holding below the critical.

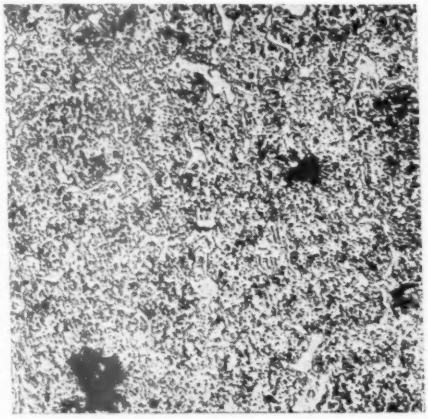

FIG. 10.—CHROMIUM PEARLITIC MALLEABLE; ETCHED WITH NITRIC ACID. (× 100.)

An investigation was carried out some years ago by Rebecca Hall[30] upon the use of chromium, and it was found desirable to increase the silicon content with the chromium additions. Even so it is unusual for chromium pearlitic malleable to be produced without some proportion of free cementite being retained. However quite reasonable ductility, as determined by measurement of elongation, is achieved, and high wear resistant properties are ascribed to this type of product. The structure of a chromium pearlitic malleable is illustrated in Fig. 10. Much free cementite persists, but the particles are generally small and rounded. The matrix is spheroidised, a usual feature with chromium metal. This example contained 0.40 per cent. Cr and 1.68 per cent. Si. The amount of added silicon is 1¾ times the chromium content, and much greater than recommended by Rebecca Hall, who appeared to be guided by the physical properties obtained without relation to the micro-structures.

Vanadium has been used in quantities of the order of 0.1 per cent., and this element effectively prevents decomposition of the carbide, but the cementite structure is so massive that shock resistance is poor, and

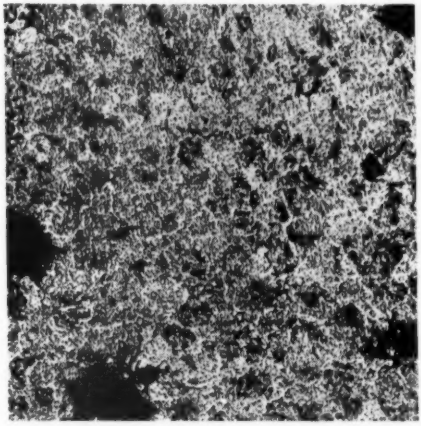

FIG. 11.—MANGANESE PEARLITIC MALLEABLE; ETCHED WITH PICRIC ACID. (× 100.)

it does not appear that much commercial use has been made of this alloy. Manganese has been utilised in quantities from ½ to 1 per cent. above the amount normally present in blackheart malleable. Manganese has a milder effect than chromium, and there is no difficulty in completing first stage graphitisation, whilst the second stage is retarded even under conditions of very slow cooling. Fig. 11 shows the pearlite structure retained with manganese upon slow cooling. Only very small quantities of free ferrite are present. The pearlite is well laminated, as shown in Fig. 12, which is from the same specimen. A tendency towards

Pearlitic Malleable Cast Irons

spheroidisation is noticeable. To obtain a completely spheroidised structure it is necessary to cool rapidly through the critical temperature and then hold just below for a period of some hours. The structure produced is shown in Fig. 13.

Molybdenum has also been used in quantities of the order of 0.2 to 0.6 per cent., usually with some slight increase in silicon content. The effect of molybdenum is more drastic than manganese, but less so than chromium. There is a further advantage attached to the use of retarding elements in that after air or oil-quenching from the annealing temperature, reheating just below the critical can be used to produce

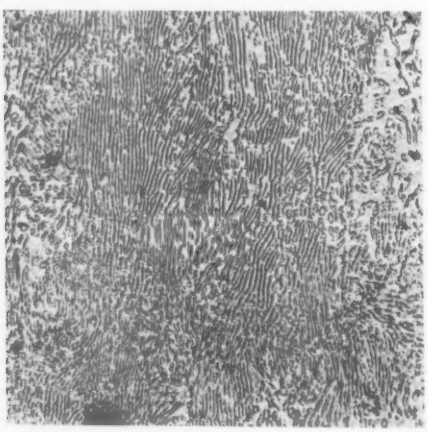

FIG. 12.—SAME SPECIMEN AS FIG. 11; ETCHED WITH PICRIC ACID. (× 500.)

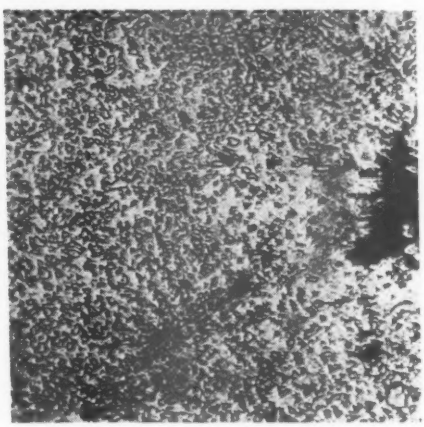

FIG. 13.—SPHEROIDISED SPECIMEN; ETCHED WITH PICRIC ACID. (× 500.)

TABLE I.—*Typical Mechanical Properties of Pearlitic Malleable Cast Iron.*

Production class.	Structure type.	Tensile strength. Tons per sq. in.	Yield point. Tons per sq. in.	Elongation. Per cent.	B.H.N
Mn	Bullseye	30	18	10	150
,,	Lamellar	35	21	6	180
Mn Cu	Lamellar	36	22	5	190
Mn	Spheroidal	31	22	16—18	179
,,	,,	36	25	12—14	191 (*a*)
,,	,,	40	28	9—11	207 (*a*)
,,	,,	45	31	6—8	217
Ni Mn	Sorbite	35	22	6	210
,,	,,	37	24	6	210
,,	,,	39	26	5	210
Arrested	,,	39	24	4.5	190
,,	,,	49	28	3	230
,,	,,	54	36	1	350 (*a*)
Ni Cr	,,	40	27	8	200 (*a*)
Si Mo	,,	35	31	3.5	245 (*b*)
Re-heated	,, net	31	22	10—14	170—190 (*a*)
Si Cr	Free carbides	35	24	3	210
Va	,, ,,	31	28	3.5	211 (*a*)

(*a*) Symposium on Pearlitic Malleable Cast Iron, A.S.T.M., 1936.
(*b*) *Cast Metals Handbook*, 1940 Edition, A.F.A.

a spheroidal structure of the carbide, which gives enhanced ductility. The spheroidising treatment requires a long holding time, and is not readily possible without alloying elements, as otherwise second stage graphitisation proceeds so rapidly as seriously to reduce the combined carbon content.

Alloys can also be used for their effect upon the matrix structure as distinct from the effect upon graphitisation, and in this respect they may also render the metal more sensitive to further heat-treatment. Copper has been used in this manner, but its effect is very mild, only slightly increasing the tensile and yield strengths. Nickel has a more pronounced effect, and gives appreciable increase in tensile strength and yield without materially affecting the hardness of ductility. Schwartz[21] has shown that small quantities of nickel destroy the effect of silicon in accelerating graphitisation, and also that the graphitising process appears to

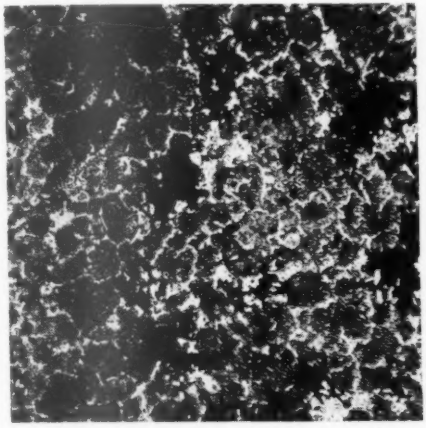

FIG. 14.—NICKEL ABSENT; ETCHED WITH PICRIC ACID. (× 100.)

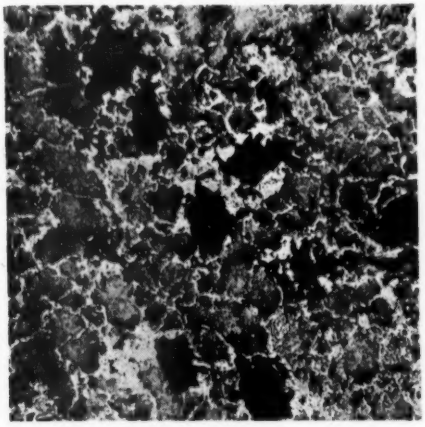

FIG. 15.—NICKEL, 0.33 PER CENT.; ETCHED WITH PICRIC ACID. (× 100.)

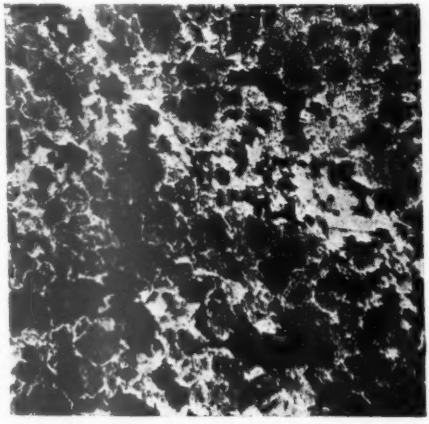

FIG. 16.—NICKEL, 0.78 PER CENT.; ETCHED WITH PICRIC ACID. (× 100.)

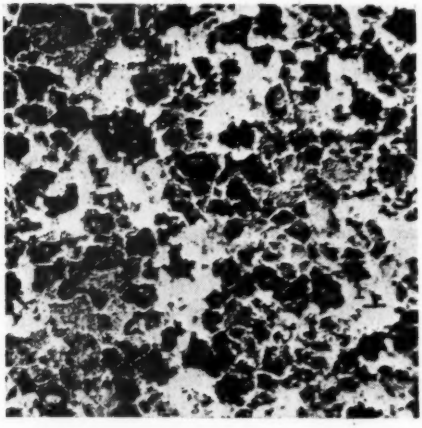

FIG. 17.—NICKEL, 1.84 PER CENT.; ETCHED WITH PICRIC ACID. (× 100.)

Pearlitic Malleable Cast Irons

take place by some different mechanism. The graphitisation accelerated by silicon proceeds by increase in the size of the graphite nodules, whereas in the case of nickel it appears to progress rather by increase in the number of nodules.

There is a further effect of nickel in that the second-stage graphitisation proceeds further with increasing quantity of nickel, so that structures which would normally be all pearlitic contain appreciable quantities of ferrite. This ferrite no doubt accounts for the maintenance of ductility, whilst the higher strengths obtained are due to the carbide being present in the sorbitic rather than pearlitic form.

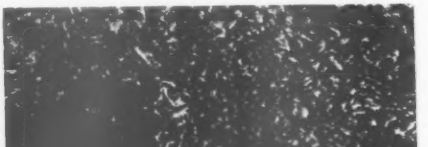

FIG. 18.—NICKEL, 0.78 PER CENT.; OIL QUENCHED FROM 780 DEG. C.; DRAWN AT 500 DEG. C.; ETCHED WITH PICRIC ACID. (× 500.)

The nickel alloyed material is also more sensitive to subsequent heat-treatment. Figs. 14 to 17 illustrate the effect of nickel in quantities increasing from nil to 1.84 per cent. The samples were all from one melt of metal and were annealed together. It will be observed how the amount of ferrite increases with nickel content. In Fig. 14 the carbide structure is pearlite, but in Figs. 15 to 17 it is sorbite.

Physical Properties

A fairly comprehensive survey of the varying tensile properties obtainable with pearlitic malleable cast iron are given in Table I. Under the heading of Production Class is given the controlling medium by which the material is produced, and under Structure Type is indicated the particular feature of the micro-structure. The first two manganese class and the manganese copper are produced by a slow-cooling method, whereas the next group of manganese metals with the spheroidal structure are produced by rapid cooling from the annealing temperature, followed by a spheroidising treatment just below the critical. It is apparent that this type of structure gives a better ratio of ductility to strength. The nickel-manganese irons were produced by slow-cooling methods, and show the slightly improved tensile and yield stress obtainable with nickel additions. The arrested anneal material was produced by rapid cooling from the annealing temperature, and in the last example shown an oil-quench was used. In the case of the reheated example, as mentioned previously, the structure can be taken to a greater degree of diffusion of redissolved carbon with increase in tensile strength, but reduction in ductility.

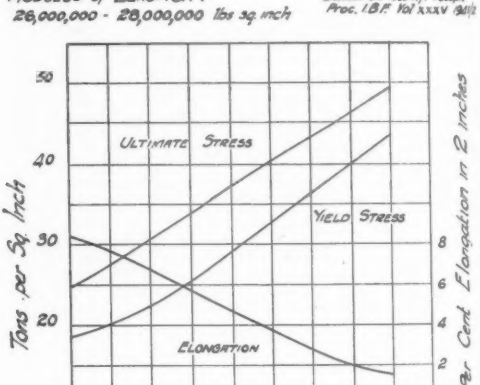

FIG. 19.—TYPICAL PHYSICAL PROPERTIES OF PEARLITIC MALLEABLE CAST IRON.

TABLE II.—*Tensile Properties of Chromium Pearlitic Malleable Cast Iron.*

Cr. Per cent.	Tensile strength. Tons per sq. in.	Yield point. Tons per sq. in.	Elongation. Per cent.	B.H.N.
0.22	31.3	18.9	11.0	175
0.37	34.3	22.0	9.5	179
0.56	35.9	23.4	6.0	201
0.84	35.7	26.4	4.0	213
1.08	34.2	27.7	3.0	223

Extract from "High Strength and Wear-Resistant Malleable Cast Iron," by Rebecca Hall, Trans. A.F.A. Vol. 41 (1933).

The figures shown in Table II are extracted from Rebecca Hall's Paper mentioned previously. It should be pointed out that in addition to the chromium content, the silicon was increased by an amount equal to one-half to three-quarters of the added chromium. The yield stress and hardness are increased with the chromium additions and the ductility reduced. In the next Table III the tensile properties with increasing nickel content are given. The nickel, as pointed

TABLE III.—*Tensile Properties of Nickel Pearlitic Malleable Cast Iron.*

Ni. Per cent.	Tensile strength. Tons per sq. in.	Yield point Tons per sq. in.	Elongation. Per cent.	Diamond hardness.
		In Annealed Condition.		
Nil	35.04	21.00	6.0	213
0.33	34.80	21.58	5.5	212
0.78	36.85	23.46	5.5	214
1.84	38.65	25.74	5.0	210
		Hardened and Tempered.		
Nil	52.43	44.35	0.5	351
0.33	54.80	44.00	0.5	358
0.78	58.18	43.57	1.0	347
1.84	60.00	43.70	1.0	343

out previously, strengthens the material without seriously decreasing the ductility, and also considerably improves the strength upon hardening. It may be noticed here that the hardened and tempered material shows little variation in the yield stress and elongation, and this appears to be a feature of heat-treated pearlitic malleables.

Fig. 18 shows the structure of the hardened and tempered metal containing 0.78 per cent. Ni, in which the matrix is pseudo-martensite. Fig. 19, a reproduc-

TABLE IV.—*Tensile Properties from Stress-Strain Diagram.*

Property.	Pearlitic malleable.	Blackheart malleable.
Ultimate stress. Tons per sq. in.	36.15	24.00
Yield stress. Tons per sq. in.	19.70	14.50
Proportional limit. Tons per sq. in.	12.50	8.00
Elongation. Per cent in 2 in. ..	5.0	15.0
Modulus of elasticity. Lb. per sq. in.	28,250,000	25,000,000

tion of a graph by Joseph,[22] again shows a range of tensile properties obtainable, and these are related to hardness number. These data are from unalloyed material, rapidly cooled from the annealing temperature and subsequently heat-treated just below the critical for varying lengths of time. The physical properties of hardened and tempered pearlitic malleable are shown in Fig. 20, where the hardness and tensile properties are related to tempering temperatures. Once again it is seen that the yield stress and elongation show little variation through the range of heat-treatments employed. The tensile properties determined from stress-strain diagrams are shown in Table IV, compared with those of blackheart malleable. The proportional limit is very appreciably higher in pearlitic malleable, as also is the modulus of elasticity.

It may be noted that in Fig. 19 Joseph gave a range of 26,000,000 to 28,000,000 lbs. per sq. in. for the modulus of elasticity. Little work has been done upon the fatigue properties of pearlitic malleable, but some results are shown in Table V compared with examples of cast iron, wrought mild steel

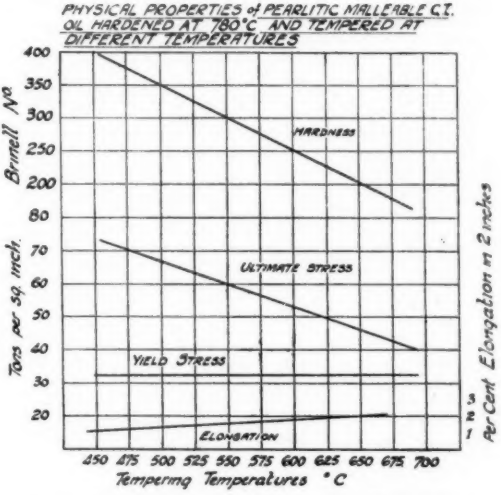

FIG. 20.—PHYSICAL PROPERTIES OF HARDENED AND TEMPERED PEARLITIC MALLEABLE IRONS.

TABLE V.—*Comparison of Fatigue Properties.*

Material.	Tensile strength. Tons per sq. in.	Endurance limit. Tons per sq. in.		Endurance ratio.	Notch reduction.
		Plain.	Notched.		
					Per cent
Pearlitic malleable	35.1	13.7	11.3	0.39	17.5
Cast iron(*a*)	15.8	8.9	8.9	0.56	Nil
Mild steel (*a*)	34.3	17.2	11.4	0.50	33.7
Nickel steel	51.5	22.5	13.5	0.44	40.0

(*a*) Cornelius and Bollenrath, "Die Giesserei," Vol. 23, No. 10.

and nickel steel. Generally, in ferrous materials the endurance ratio, that is, the ratio of the fatigue limit to the tensile strength, is of the order of 0.5, and it is surprising to find the ratio only 0.39 in this example of pearlitic malleable. As further data become available, it will be possible to confirm whether this is characteristic of these materials.

It is noticeable that the notch sensitivity is much less in the pearlitic malleable than in the case of the wrought steels, and this falls somewhat in line with experience obtained with cast irons where the reduction due to notch is from zero up to some 10 per cent. No data appear to have been published upon the impact testing of pearlitic malleable, but in an example with a tensile strength of 35 tons per sq. in., Izod values of 8 to 10 ft.-lbs. have been recorded. This compares with 14 to 16 ft.-lbs. for ferritic blackheart malleable.

It would appear that with other structures, such as the spheroidal and ferrite-sorbite, higher impact values might be obtained. Impact testing of materials of this order of shock resistance by means of the standard 10 mm. square notched bar using the Izod machine, does not appear to be sufficiently discriminating, and is probably too sensitive to imperfections of the notch surface satisfactorily to illustrate the differences existing in the various types of pearlitic malleable. Kikuta[22] used a 30 kg. Charpy machine and a 15 mm. square bar with a 2 mm. notch upon blackheart malleable, and obtained figures of the order of 25 ft.-lbs. With various heat-treatments he obtained a range of results from 4 to 45 ft.-lbs., and a sufficient uniformity in duplication which suggests that larger size bars with reduced notches may be useful in comparing the shock resistance of pearlitic malleables.

It has now been seen that a great variety of physical properties is obtainable with pearlitic malleables, and that they are all characterised by high tensile and yield strength, high modulus of elasticity and fatigue endurance limit. The wear resistance is imperfectly indicated by the Brinell hardness, and claims are made that wearing properties are superior to those expected from a consideration of indentation hardness tests. Machineability varies with type, but generally can be regarded as superior to steels of similar Brinell hardness.

Applications

The qualities which recommend pearlitic malleables to their numerous applications are essentially high strength, great rigidity, wear resistance, high fatigue properties, and response to full and local hardening. Pearlitic malleables are utilised for elevator and driving chain links and sprockets, stoker parts, machine tools, liner plates and numerous automobile details, such as axle housings, differential carriers, brake drums, camshafts, crankshafts, connecting rods, gear blanks, pistons and piston rings. It would appear that the future of these materials lies largely in the appreciation of manufacturers of the difficulties of production and of the necessity for modern heat-treatment furnaces capable of accurate temperature control, so that results can be reproduced and uniformity of product maintained.

Acknowledgments

Acknowledgment is made to Ley's Malleable Castings Company, Limited, for permission to publish much of the information included in this Paper, to Mr. W. T. Evans for his stimulus during the early days of pearlitic malleables, and to Mr. W. H. Smith and Mr. H. Greatorex for their great help in experimental work over a period of years, and also in the production of the present illustrations.

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Peat Moss in Magnesium Metallurgy

Canadian and U.S.A. makers of magnesium are increasingly using peat moss as a refining agent in the manufacture of magnesium. One of the principal refiners will require from 700,000 to 1,000,000 bales of sphagnum peat moss a year. The quantity and quality of the peat moss required are not obtainable in the United States, but the British Columbia output meets requirements and, if production could be increased, adequate supplies would be available.

IMPROVING STEELFOUNDRY OPERATIONS*

By DANIEL CLARK

Visits to many steelfoundries in Great Britain, America and most of the European countries a few years ago revealed three outstanding facts in quite a large percentage. Firstly, insufficient floor space in the moulding bays; secondly, bad lighting, both natural and artificial; and, thirdly, the heat-treatment equipment did not equal that normally provided for the product of forge and rolling mills.

In designing new foundry buildings or extending old ones, every consideration should be given to capturing all the daylight possible, since a bright atmosphere not only reacts beneficially on the outlook and mentality of the operatives, and therefore makes for a higher standard of work, but it also reduces lost time due to accidents.

Bad as are the conditions in some foundries in daytime, they often prove to be much worse at night. Before installation, the lighting expert should first of all consult the foundry executives, as it is obvious that whether roof lighting or side lighting should be adopted will depend upon the layout and location of the equipment. It is conceivable, indeed, in some instances even in the same shop that roof lights should be provided in some areas and side lights in others. When the electrician comes along to instal the lighting system, the chief concern appears to be to place them with almost mathematical precision down the centre of the shop, whereas the foundryman would be better served if they were arranged to suit the layout of the plant and the nature of the operations involved. In other words, less attention should be paid to symmetry, and more to utility. The moulder should be regarded as an artist, and if he is to produce castings he would be proud to autograph, he must be provided with ample light just where he requires it most, otherwise his mental reactions, and therefore his efficiency, will be affected.

Sand, Its Preparation and Ramming

In the matter of quality, many of us who were avowed advocates of mechanical testing and the employment of synthetic sands with organic or other binders rather than natural sand with a certain inherent bond, are somewhat receding from this position. This is not due to loss of faith, but rather acceptance of the view that no method of testing yet evolved supplies all the answers in a jobbing foundry where the work varies, not only as to size and weight, but also composition of the metal itself.

The preparation of synthetic sand and its mechanical testing is justifiable and desirable in foundries engaged in mass-producing large numbers of one type of casting, such, for example, as required by the automobile or aircraft industries, either in ferrous or non-ferrous alloys, but for work of a varied character, particularly when dealing with steel, both carbon and alloyed, it cannot be truthfully said that synthetically prepared and mechanically tested sand produces any better results than good natural sand prepared and tested in the old-fashioned way by a thoroughly competent tradesman. Nowhere, perhaps, is this more exemplified than in Belgium, where nothing else than local natural sands are used without the aid of mechanical testing, and yet it is extremely doubtful if their product could in any way be improved by the employment of physically tested synthetic sand. The skill of the craftsman plays a not insignificant part in this.

Too much stress cannot be laid on the importance of milling time, and some of the casting troubles are directly attributable to this. To ensure regularity from batch to batch, the use of an hour glass is suggested. Because of its influence on density, the question of ramming, whether it be mechanical or by hand, is also of vital importance in any analysis of foundry operations.

Where moulding machines are employed, the number of jolts and jars should be standardised for a particular job and not left to the discretion of the man whose attention from his work may at times be distracted. To achieve this requires investigation as to the number of jolts producing the best results; then provide a cut-out, mechanically stopping the machine at the required time. Hand ramming for steel should be so done that a well and evenly compacted mould is obtained giving adequate strength to withstand without disruption not only the inrush of metal, but, what is perhaps more important, contraction stresses.

Castings Replacing Forgings

It is now nine years ago since the company with which the lecturer is associated took a revolutionary step by casting a marine crankshaft for a large overseas vessel. This was to replace a forged one which fractured at sea and enabled the vessel to resume her return voyage from Australia to London with the minimum delay. It represented the first cast steel crankshaft ever accepted by Lloyds on a vessel built under their supervision. In crankshafts where savings in weight are essential, the casting has a distinct advantage over the forging, because of the facility with which it can be cored. Many submarine crankshafts are cast in this way.

Whilst cast crankshafts have proved for many purposes to give at least equal service to forgings, quite satisfactory service would be given by a well-designed built-up composite job, the shafts portions being forgings and the throws castings. This method would particularly apply to very large shafts, expensive and difficult to forge. They should prove cheaper and at least as satisfactory as the completely forged unit. Railway engineers all over the world appear to be still adhering to forged locomotive shafts, but in view of the progress made with cast cranks during the past ten years and the facilities now available for X-raying, a trial with castings seems long overdue. If some enlightened and enterprising railway system would only have the courage to undertake the experiment, it would probably be found that cracked bear-

* Abstracted from a Lecture delivered at a Meeting of the Institute of Australian Foundrymen, Mr. W. Main, presiding.,

Improving Steelfoundry Operations

ings due to hot boxes would be greatly reduced. When all is said and done, a locomotive crankshaft is only a modest unit.

In some articles the lecturer was privileged to write, the last about four years ago, which appeared overseas, entitled "Castings versus Forgings," he pointed out certain advantages castings possess when compared with forgings. First, castings have better damping properties than forgings, and therefore on parts revolving above certain critical speeds, vibrations are more effectively absorbed. Secondly, they do not exhibit the directional weaknesses of forgings and accommodate themselves more readily to service conditions without cracking, irrespective of the planes of stress. Thirdly, the axial weakness characteristic of a forging due to segregation is less evident in a casting. Fourthly, they are slightly more resistant to atmosphere corrosion and abrasion, and, lastly, they are cheaper.

Since these articles were written, the foundry has made still further assaults upon the citadel within which the forge has entrenched itself. The latest development is centrifugal casting. Gun barrels, bombs, aircraft cylinder barrels and trench mortar shells are now being successfully cast in this way. Expanding knowledge and extended use of gamma and X-ray equipment has made possible the rapid advances in this sphere since the commencement of war. This fresh phase of foundry activity is fraught with tremendous possibilities for the future, and just how far and how quickly centrifugal casting will develop will depend upon the amount of research focussed upon it.

Armour for tanks, formerly produced from rolled alloy steel plates, are now being cast. Very considerable weight savings have been effected by employing castings. Such armour is now being produced in Australia, and whilst it is not permissible to submit actual data, this much can be said, that its quality at the moment is not surpassed abroad.

Keeping Historical Records

No foundry can ever hope to remain in business indefinitely unless proper operational records are kept. When once it has been amply demonstrated that a particular method produces satisfactory castings with the lowest metal loss, sketches should be made showing the location and areas of runners and risers and all other relevant data. Such records should be the property of the company and appropriately indexed so that the foreman or leading hand may consult them before commencing a particular job to ascertain what difficulties, if any, were previously encountered, and what were the remedies prescribed.

They must be designed to be not only instructive, but constructive, and brief entries made showing other methods tried, and why they were discarded in favour of that finally adopted. Records such as these are invaluable not only in preventing new executives perpetuating the blunders of their predecessors, but

(*Concluded in next column.*)

INFRA-RED LAMP HEATING

At a recent meeting of the Institution of Electrical Engineers, Mr. F. E. Rowland opened a discussion on "Infra-red Lamp Heating and its Application to Industrial Purposes." He pointed out that the principal advantage of infra-red lamp heating was that the heat was transferred directly from the source of energy to the object to be heated without raising the temperature of the intervening atmosphere; consequently heating up of the object is extremely rapid. The plant is easy to instal, occupying little space and in general it does not require special foundations. No time is wasted in preliminary heating up as the plant is ready for immediate use when switched on.

Lamps are employed as a source of heat because they provide an efficient and powerful source of infra-red energy whilst the glass bulb not only serves to enclose the filament in a suitable gas, but also reduces convection losses. The small dimensions of the filament provide a highly concentrated source which enable the radiation to be controlled by suitable reflectors. The lamps used are rated at 115 V, 250 W, this type having been standardised for convenience of wartime manufacture. The 115-V standard has been adopted because it might be used on the power supplies in general use by grouping lamps suitably, an added advantage being the more robust filament.

With the equipment at present available, temperatures of from 260 to 315 deg. C. are obtainable, the precise temperature depending on the material and article being heated. For instance, 20 gauge sheet steel with a dull black surface would reach a temperature of 260 deg. in 2 or 3 minutes, this surface absorbing radiation more readily than one which was brightly polished and light coloured and it would moreover reach a higher maximum temperature. At present the most important application of infra-red lamp heating is paint drying. Low-temperature stoving enamels, with a drying time of 60 min. in a convection oven can be dried in 10 min. by infra-red and a reduction of 90 per cent. in time is by no means uncommon.

(*Concluded from previous column.*)

also in enabling them to consider improvements to the light of added knowledge and experience. Since every apprentice ought to be regarded as a potential executive, it is in the interest of employers to give the lads the best possible training. It is comforting to note that many foundries in Australia are appreciative of this factor, which promises well for the future of the industry in the Commonwealth. These sketches, with their annotations, should be regarded as educational, and any employer would be amply repaid who permitted a foreman or leading hand to devote a certain amount of time at prescribed intervals to giving talks to apprentices using the sketches as their text-book.

OPTICAL CUT METHOD FOR THE DETERMINATION OF SURFACE ROUGHNESS

By J. FERDINAND KAYSER, Assoc. Met.

From time to time descriptions of an optical method of obtaining a profile curve of a surface have appeared, but the details of the actual system have been meagre and sometimes misleading. The method was apparently devised by Schmaltz or Eppenstein, and was originally named "Lichtschnittverfahren" or "Verfahren der Schattengrenze" (light-slit process or shadow edge process). Both these titles are misleading because neither light slit nor shadow edge is an essential feature of the method.

The author's arrangement for obtaining optical cuts is illustrated in Fig. 1. The apparatus used is a Vickers projection microscope, with a suitable addition to the illuminating system and with a subsidiary stage to hold the sample whose surface is being examined.

Briefly, the illuminating system is so arranged that it is possible to focus the image of a straight edge on to the surface under examination. A stainless steel safety razor blade is used to provide the straight edge, and this is carried in the filter holder A and is illuminated from the rear by a Point-o-lite lamp and lens system supplied with the microscope. The fitting B consists of a tube which carries a microscope objective and has vertical and horizontal adjustments to enable it to be properly aligned. For work at magnifications between approximately 20 and 300 a ¼-in. objective is used to produce the image of the straight edge. The sample whose surface is being examined is placed on the holder C, which inclines its surface at an angle of 45 deg. both to the axis of the illuminating system and to the axis of the microscope. In order to bring the viewing microscope objective sufficiently close to the surface it is necessary to provide an extension collar.

First the illuminating system must be properly aligned in a horizontal and vertical plane. The sample is next placed on the inclined stage, and its image is focussed on the microscope screen. It is, of course, only possible to bring into focus a narrow band, and the stage must be manipulated so that it (the band) is in the centre of the field. The straight edge is then placed in position in the filter holder and its image focussed on the portion of the surface which is already in focus on the screen. If the surface under examination is optically flat one sees an enlarged image of the straight edge, but if, as is usually the case, the surface is undulating, one sees an undulating line.

In order to prevent flare it is sometimes desirable further to restrict the illuminated area by the use of a second straight edge, and it is this that has led to the method being called the "light-slit process"; the second straight edge is not, however, an essential, but a convenience, and with many surfaces equally good results can be obtained with either arrangement.

The magnification attainable is limited by constructional and optical considerations. As the surface under observation must be inclined to the two optical axes, it is not always possible to make observations of all parts of a surface. This difficulty increases with increase in magnification due to the fact that the working distance of the observing microscope objective and the general structure of the microscope may be such that the sample cannot be put in position for examination. Furthermore, the perfection of the image of the straight edge does not permit of magnifications greater than approximately 300 diameters. Under ordinary circumstances it is consequently possible to use the method for determining profile irregularities of the nature of 0.5 μ (20 micro-inches).

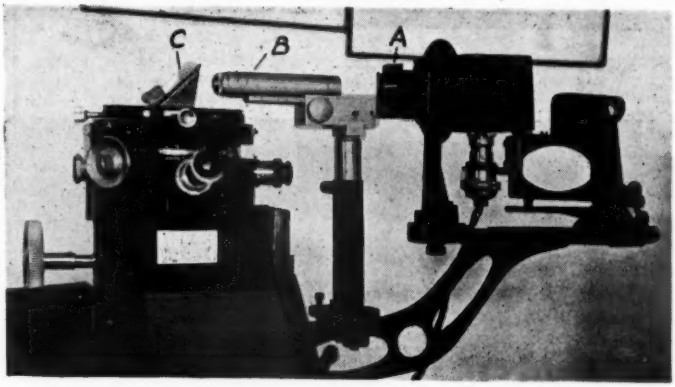


FIG. 1.—VIEW OF APPARATUS.

The outstanding characteristic of this method of determining surface roughness is that it is non-destructive and is, consequently, cheaply and easily applied. Not only is it applicable to machined and ground surfaces, but also to "as cast" surfaces and fractured surfaces. Furthermore, it is not limited to reflecting surfaces, but may be applied to surfaces in general, including sand-blasted surfaces, the surfaces of moulds and cores, the surfaces of abrasive wheels, and even to textiles.

The microscope is, of course, only necessary if a high magnification is required, and many surfaces can be usefully examined by this method using an ordinary camera. The image of the straight edge may then be

Determining Surface Roughness

produced by an ordinary projection lantern. The latter arrangement is particularly suitable for determining the roughness of road surfaces. For that purpose, it is, of course, necessary to work after dark or to enclose the lantern and the camera inside a large crate.

When examining profile curves determined by this process it must be remembered that the magnification in the vertical plane is $\sqrt{2}$ times the magnification in a horizontal plane. This, in general, is advantageous.

The application of the process to fractured surfaces is illustrated by Figs. 2 and 3; Fig. 4 shows the surface of an abrasive wheel. A profile of a machined surface is illustrated in Fig. 5, whilst Fig. 6 shows the same surface after grinding. In the case of photographs shown in Figs. 2, 3 and 4, two edges were used in the illuminating system, whilst for those of Figs. 5 and 6 one edge only was used.

FIG. 2.—FRACTURE OF DURAL TENSILE TEST-PIECE. (× 11.)

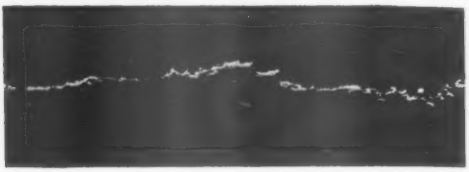


FIG. 3.—FRACTURE OF HIGH-SPEED STEEL INGOT. (× 19.4.)

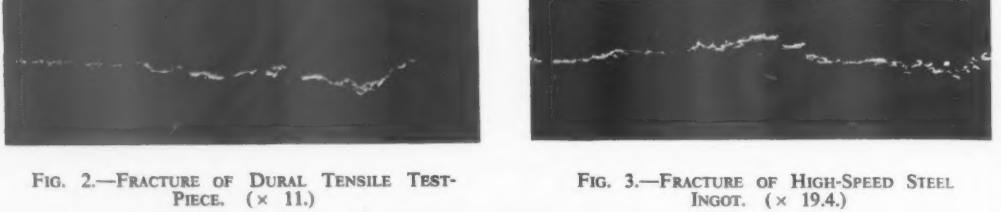


FIG. 4.—SURFACE OF ABRASIVE WHEEL. (× 47.)

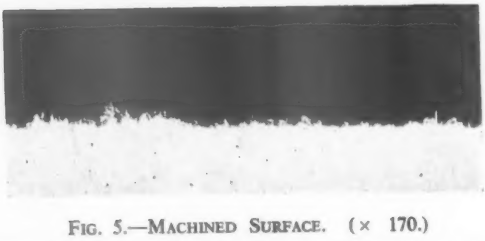


FIG. 5.—MACHINED SURFACE. (× 170.)

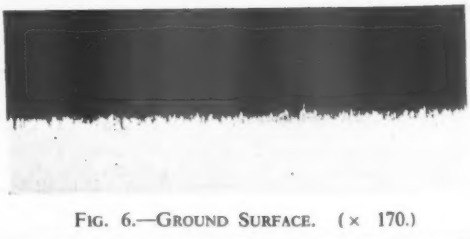


FIG. 6.—GROUND SURFACE. (× 170.)

The Winter number of "The Whiting Founder," the house organ of the Whiting Corporation of Harvey, Illinois, U.S.A., contains as its principal article a description of a cradle furnace, normally fired by pulverised fuel and provided with rocking mechanism. It can serve as a mixer for any type of metal or alloy where homogeneity in composition is an essential. Figures disclosed show that only 700 lbs. of coal per hour is used for handling 10 to 12 tons per hour of cast iron.

THE FUTURE OF ALUMINIUM

ALCOA'S VIEWS

The average United States production of aluminium for the ten years 1929-1938 was 91,000 short tons per year. By the end of 1943 it is expected that the United States will be able to produce aluminium at the rate of 1,050,000 tons a year. In other words, more than eleven times as much aluminium will be looking for civilian markets and uses after the war as pre-war.

The Aluminum Company of America, which was the only producer of virgin ingot aluminium in the United States prior to the war, in outlining the post-war markets for aluminium, mentions three general factors which will influence the use of aluminium. These are: price, quantity available, and increased number of workers possessing the knowledge and experience of fabricating and handling aluminium. In their opinion the most important factor is price, which throughout the history of aluminium has shown a downward trend. The metal entered the period of war preparation at 20 c. a lb., and four price reductions have been made since then, to bring the price of aluminium ingot down to the all-time low of 15 c. a lb. with pig aluminium at 14 c. a lb. Alcoa believes that with this basic price policy downward, lower prices may be anticipated. In connection with price the specific gravity of aluminium must be taken into account in any comparison of cost between aluminium and other metals for a given article. Since the volume of metal is usually the same, the price per lb. of aluminium should be divided by the ratio of the specific gravities (approximately three for most of the common metals), when comparing material costs.

As a result of the war, the number of workers knowing how to fabricate, cast, form and assemble the basic products of aluminium into useful commercial articles has increased materially, and Alcoa believes that this should influence the amount of aluminium employed in post-war applications.

Civilian Application

Many of the developments of aluminium research laboratories which are of immediate use for the military programme, also promise to be useful in civilian applications in the after-the-war period. For example, aluminium alloys of greater strength can be employed now in giving superior performance to war planes, but will also open up wider fields of application for the aluminium alloys after the war. Finishes, unique to aluminium obtained by chemical and electrochemical treatments and synthetic resin coatings, are being developed and applied in the finishing of aircraft and other military equipment; that will also make aluminimum more useful later in civilian applications. Another example is the new joining techniques such as brazing which are making possible lightweight assemblies for aircraft.

Because of the great amount of advertising and publicity which has been given to the new field of plastics, Alcoa say it is often asked if it is not afraid of competition from this direction, and that the question has at times carried the implication that Alcoa must be planning to "fight" plastics. Actually Alcoa is finding many ways in which plastics and other new materials may supplement and promote the use of aluminium, and that among the plastics are materials which, in conjunction with aluminium, will often do a better job than either material can do alone.

In its opinion, the first post-war automobile will undoubtedly look pretty much like the 1942 models from design standpoint, and the real post-war car will not appear until enough time has elapsed for proper development. They indicate that aluminium, magnesium and plastics will be the three principal new methods of construction.

The use of aluminium in trucking equipment is simply a matter of arithmetic—for every pound of deadweight saved a pound of pay-load generally can be added. Operators realising this used aluminium before the war, but the truck promises to be a market of even greater applications of aluminium after the war.

TABLE I.—*Use of Aluminium in the United States by Industry.*

	November, 1939, per cent.	December, 1940, per cent.	May, 1942, per cent.	Estimate after war, per cent.
Transportation (land, air and water) ..	29	40	63	34
Cooking utensils ..	14	6	1	10
Electrical conductors	10	5	0	8
Machinery and electrical appliances	15	9	6	12
Building construction	8	5	3	9
Chemical	5	5	5	5
Foundry and metal working	4	23	19	9
Ferrous and non-ferrous metallurgy ..	5	4	2	4
Food and beverage	6	2	0	5
General miscellaneous	4	1	1	4

In the pre-war period the aluminium beer barrel got under way slowly at first, but it was found to be an excellent container for beer, and brewers had begun to buy it in large quantities. A typical half barrel of aluminium weighs only 18 lbs., where a wooden barrel of the same capacity weighs 65 lbs. The aluminium barrel does not have to be pitched since aluminimum does not affect the taste, odour, colour, clarity or limpidity of beer, and there are no maintenance problems to speak of with the aluminium beer barrel.

Table I shows the use of aluminium by industry before the war, before America's entry into the war, after her entry into the war, and an estimate of post-war markets.

The Argentine Government will in future control all prospecting for metalliferous ores, especially zinc and copper ores. Prospecting has recently become much more active in various parts of the republic.

BIRTHDAY HONOURS

The Honours List, issued on the occasion of the official celebration of the King's Birthday, contains a number of appointments, of interest to the foundry trade, of Officers and Members of the Order of the British Empire and an award of the British Empire Medal.

O.B.E. (Civil Division)

W. Crowson, special director and works superintendent, Vickers-Armstrongs, Limited; B. A. Duncan, superintendent, Vickers-Armstrongs, Limited; H. Ferrier, managing director, Rankin & Blackmore, Limited; G. W. Harriman, production manager, Austin Motor Company, Limited; H. Hillier, director and chief executive engineer, G. & J. Weir, Limited; A. L. Kewney, director and manager, Amos & Smith, Limited; A. N. Spriggs, general works manager, Hawker Aircraft, Limited.

M.B.E. (Civil Division)

E. S. Anderson, production manager, Northern Aluminium Company, Limited; J. Bayley, stamp shop superintendent, High Duty Alloys, Limited; W. G. Bedford, superintendent, Austin Motor Company, Limited; E. S. Billowes, confidential secretary, J. Samuel White & Company, Limited; H. S. Broom, design and production manager, Broom & Wade, Limited; J. Brown, works manager, David Rowan & Company, Limited; W. B. D. Brown, managing director, Glacier Metal Company, Limited; H. J. Darwood, superintendent, Daimler Company, Limited (Aero-Engines); W. S. Donnelly, works manager, Alex Findlay & Company, Limited; R. Edmonds, works manager, Vickers-Armstrongs, Limited; E. Graham, general manager, Sir W. G. Armstrong Whitworth & Company (Shipbuilders), Limited; H. W. Harper, works manager, A. V. Roe & Company, Limited; W. H. Jarratt, naval architect, Amos & Smith, Limited; R. P. Perry, manager of brass plant, John Lysaght, Limited; W. M. Rowland, joint managing director, Universal Grinding Wheel Company, Limited; R. Stein, engineer, G. & J. Weir, Limited; F. Swift, manager of foundry, Darlington Forge, Limited; P. W. Waters, chief chemist and metallurgist, Ford Motor Company, Limited.

British Empire Medal (Civil Division)

R. H. Charlton, technical assistant to works manager, Peter Brotherhood, Limited.

OBITUARY

MR. J. H. HEATON, managing director of J. H. Heaton, Limited, Keighley, engineers and ironfounders, died on June 5.

MR. SAMUEL JACKSON, works director of Beyer, Peacock & Company, Limited, Gorton, Manchester, died suddenly on June 7, in his 64th year.

MR. SAMUEL ROGER MIDGLEY, chairman of Midgley & Son, Limited, Sheffield, ferro-alloy and iron and steel merchants, died recently. Mr. Midgley was a founder of the company.

PERSONAL

MR. JAMES WINK, Aberdeen branch manager for the General Electric Company, Limited, has retired after 31 years' service with the firm.

MR. ROBERT BARLOW, chairman and managing director of the Metal Box Company, Limited, has joined the board of Baldwins, Limited.

MAJOR A. H. S. WATERS, V.C., has been elected president of the Institution of Structural Engineers for the session 1943-44. Major Waters was president in 1933-34.

MR. STANLEY W. BRINSON, master moulder, Norfolk Navy Yard, Portsmouth, Va., has been elected an honorary life member of the American Foundrymen's Association.

MR. C. E. KEEY, MR. A. E. PEARCE and MR. W. N. SHERLOCK have been elected directors of Birmid Industries, Limited. The Marquess of Sligo has resigned from the board.

MR. T. G. GREENWELL, the successful National candidate in the Hartlepools by-election, is joint managing director of the Sunderland ship-repairing firm of T. W. Greenwell & Company, Limited.

MR. LAWRENCE LEVY, who has been chairman of the board of directors of George Cohen, Sons & Company, Limited, since 1928, has recently celebrated the 50th anniversary of his joining the firm.

MR. G. A. SMITH, of Gloucester, after 51 years in the foundry trade and many years as manager of the Gloucester Foundry, Limited, has recently resigned, for health reasons. He is continuing as secretary of the company.

MR. HUBERT THOMPSON and MR. J. M. ORMSTON have joined the board of Vickers-Armstrongs, Limited. Mr. Thompson, who for some years has been commercial manager at the Barrow works, has been appointed deputy to Sir James Callender, the general manager of these works, while Mr. Ormston, the shipbuilding manager at Barrow, has been appointed general manager at the Naval Yard, Walker-on-Tyne.

Wills

RUSSELL, THOMAS, of Dundee, constructional engineer	£12,329
APPLEYARD, ROLLO, of London, physicist and submarine cable engineer	£2,536
TWEEDALE, W., of Rochdale, chairman of Tweedales & Smalley (1920), Limited	£50,775
TURNER, P. L., of Wolverhampton, director of John Thompson (Wolverhampton), Limited	£23,171
LONGMORE, W. Y., senior partner in Longmore Bros., tube and conduit manufacturers, Darlaston ...	£52,562
MARSHALL, A., of Loxley, Sheffield, chairman of Thomas Marshall & Company (Loxley), Limited, refractories manufacturers	£37,189

MRS. E. RAWDEN, of Newport, Mon., a member of the Institute of British Foundrymen, has received official intimation that her elder son, Pilot-Officer John G. D. McClelland Rawden, is "presumed lost." He was grandson of Mr. J. J. McClelland, of Newport, who has been prominently identified with the I.B.F. in South Wales.

STANTON DALE

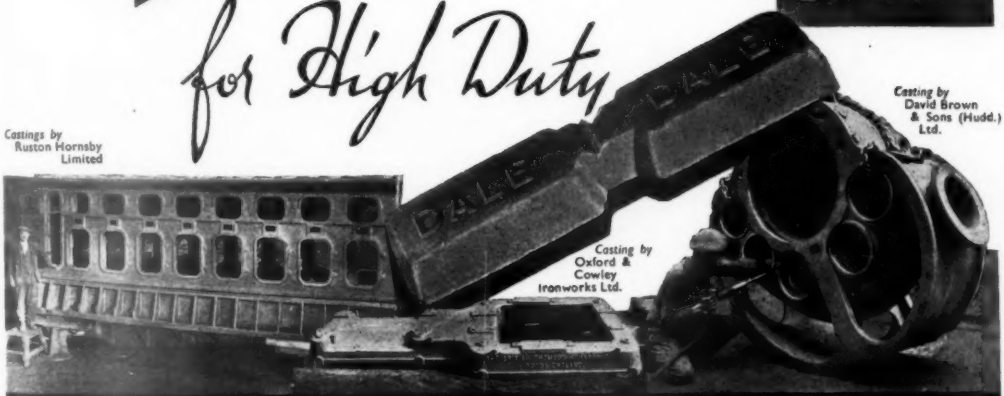
Refined PIG IRON

for High Duty

Castings by Morris Motors Limited.

Casting by Baker Perkins Limited

Castings by Ruston Hornsby Limited



Castings by Ruston Hornsby Limited

Casting by David Brown & Sons (Hudd.) Ltd.

Casting by Oxford & Cowley Ironworks Ltd.

THE STANTON IRONWORKS COMPANY LIMITED
NEAR NOTTINGHAM.

NEWS IN BRIEF

A MINIMUM RATE for all members of the Boilermakers' Society was called for at a recent meeting in Glasgow of boilermakers' shop stewards.

MR. R. R. STOKES, presiding at the annual meeting of Ransomes & Rapier, Limited, said that the effect of Lease-Lend policy was to close to them trade with South America. A sluice order had been obtained from Turkey.

ACCORDING TO the Tokyo radio, salvage operations are shortly to be started with the object of refloating and breaking up for scrap the wreck of H.M.S. "Repulse," sunk off the east coast of Malaya on December 10, 1941.

THE SALES MANAGERS' ASSOCIATION of Philadelphia, U.S.A., have shown their appreciation of the work of the Incorporated Sales Managers' Association of Great Britain during wartime, by conferring upon it the Howard Ford annual award.

WHAT IS PROBABLY a record in British factory lighting is announced by the General Electric Company, Limited. One factory of 35,000 sq. ft. in which high-grade instruments are made is being lit at the intensity of 50 foot-candles for general illumination using Osram twin fluorescent tubes.

IN THE ACCOUNT of the opening of the new laboratories of the British Cast Iron Research Association and in the list of members of the Fuel Committee, contained in our issue of June 3, the name of Mr. A. E. Pearce, of Midland Motor Cylinders, was printed Mr. A. E. Peace. We sincerely regret this typographical error.

THE HYDRO-ELECTRIC DEVELOPMENT (SCOTLAND) BILL has been read a third time. It authorises a £30,000,000 scheme under which a North of Scotland Hydro-Electric Board will be established to harness the water power of the Highlands and bring to them chemical, metallurgical and other industries likely to be attracted by cheap power supplies.

THE MINISTER OF SUPPLY has been authorised in a Treasury Order, to pay sums varying from £3,000 to £7 to companies and individuals who suffered loss by the wiping out of the obligations of the Itabira Iron Ore Company, Limited, by the Minister last year under the Defence Regulations. The losses arise from money lent to the company.

DISCUSSIONS between the Shipbuilding Employers' Federation and the Confederation of Shipbuilding and Engineering Unions have led to an agreement under which an allowance of 2d. per hour above the national uniform plain time rate for skilled classes will be paid to skilled workers in shipbuilding or repairing establishments employed exclusively as markers-off.

AT MEETINGS of the Canadian Car & Foundry Company held on May 30 the plan for liquidation of arrears of dividends on the company's preferred shares was approved by overwhelming majorities, while motions providing for certain modifications in the plan were defeated by equally wide margins. Present in person or represented by proxy were holders of approximately 58 per cent. of the combined total outstanding.

BY ARRANGEMENT with the Ministry of Production and the departments concerned, and in order to co-ordinate demands for woodworking and to utilise to the best advantage the facilities of the industry, it has been decided to establish a Directorate of Woodworking under the Director-General of Equipment and Stores in the Ministry of Supply. The offices of the Directorate are at Portland House, Tothill Street, London, S.W.1.

THE BOARD of the Institute of Physics has issued a report on the education and training of physicists which has been prepared for it by a committee under the chairmanship of Sir Lawrence Bragg. The central theme of the report is the necessity for a physicist to have a broad education so that he may be fitted both for co-operation in a team and for leadership in posts of high responsibility. The present scholarship system is criticised and its replacement, in general, by a modified system of State bursaries is recommended. An increased study of English language and literature is strongly urged in order that physicists may be able "to express themselves in clear, precise and attractive English." A knowledge of foreign languages is also considered to be important and to be a normal part of a research physicist's equipment.

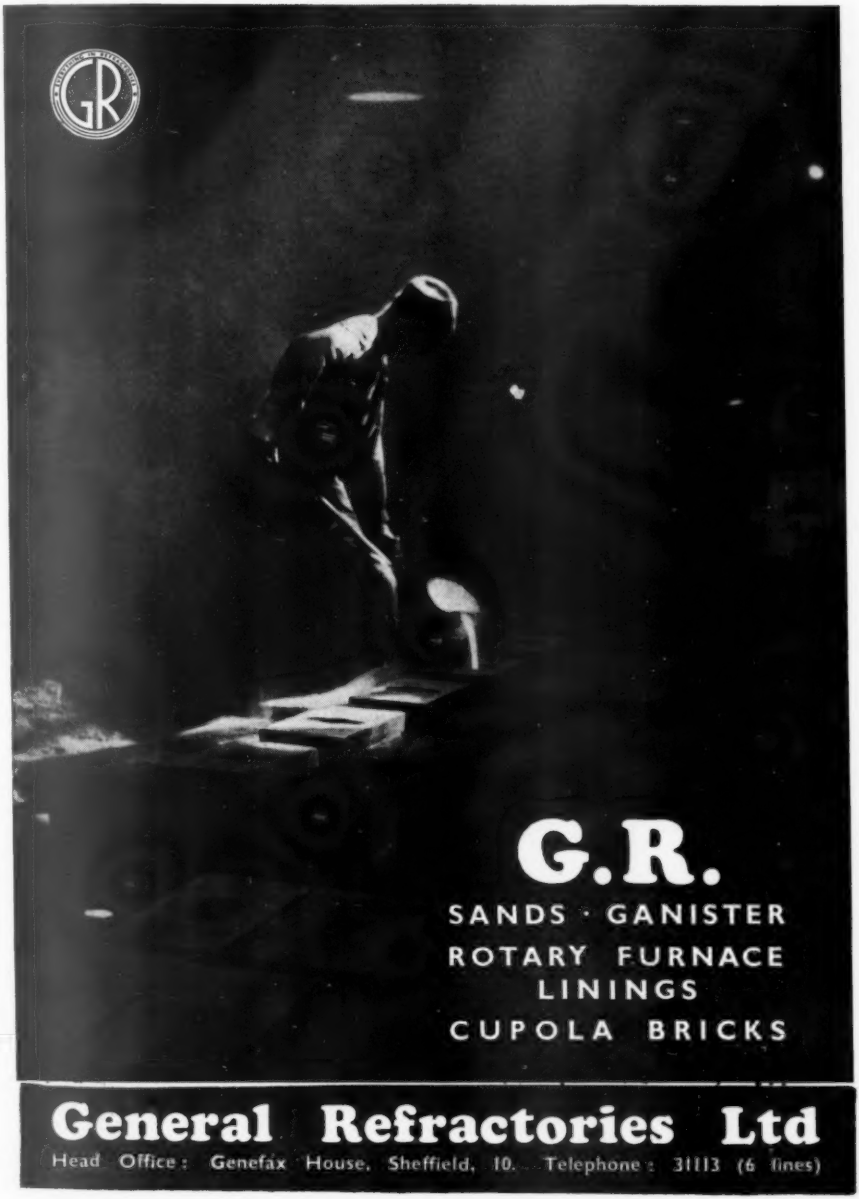
CAST-IRON SCRAP IN EIRE

The Eire Minister for Industry and Commerce has made an Order imposing restrictions on the sale or purchase of cast-iron scrap by scrap merchants and ironfounders.

Scrap iron and steel merchants will require licences, applications for which should be addressed to the Secretary, Department of Industry and Commerce, Kildare Street, Dublin, accompanied by the fee of £2. Holders of scrap licences will be precluded from disposing of scrap cast iron otherwise than through the secretary of the Ironfounders' Association of Eire. The Order will not affect the position of dealers and other collectors of scrap cast iron, except that they may not sell cast-iron scrap to any persons other than a licensed scrap merchant.

The Order provides also that a person who carries on the business of an ironfoundry will require an ironfounder's licence. Application for an ironfounder's licence should be made to the Secretary, Department of Industry and Commerce, and should be accompanied by the fee of £2. Holders of ironfounders' licences will be precluded from purchasing scrap cast iron otherwise than through the Secretary of the Ironfounders' Association. Ironfoundries in which the number of moulders normally employed is fewer than two are exempted from the Order.

The Order has been made with the object of making available to foundries greater quantities of scrap. Many foundries have been experiencing difficulties in maintaining production.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SANDS · GANISTER
ROTARY FURNACE
LININGS
CUPOLA BRICKS
General Refractories Ltd
Head Office: Genefax House, Sheffield, 10. Telephone: 31113 (6 lines)

GP 171

COMPANY NEWS

(Figures for previous year in brackets.)

Gerrard Industries—Dividend of 17½% (15%).

Wm. Denny & Bros.—Dividend of 10% (same).

Richard Hill & Company—No interim dividend.

Mitchell, Shackleton—Interim dividend of 5% (same).

Barrow Hæmatite Steel—Ordinary dividend of 5% (nil).

J. Brockhouse & Company—Interim dividend of 7½% (same).

Whessoe Foundry & Engineering—Final dividend of 30%, making 40% (same).

National Electric Construction—Net profit for 1942, £33,732 (£31,952); dividend of 10% (same).

Callender's Cable & Construction Company—Cash bonus of 5% with a final dividend of 10%, making 20% (15%).

John Thompson Engineering—Final dividend of 12½% and a bonus of 5% on the ordinary shares, making 22½% (same).

Milner's Safe—Net profit for year to March 31 last, £16,458 (£12,677); dividend of 7½% (same) and a cash bonus of 2½% (nil); forward, £5,596 (£4,138).

W. T. Henley's Telegraph Works Company—Net profit for 1942, £331,379 (£326,379); final dividend of 10% and a bonus of 5%, making 20% (same).

Hattersley (Ormskirk)—Profit for the year to March 31, 1942, £79,879, after E.P.T. and all charges other than income-tax, A.R.P., and fees; dividend of 17½% (same); forward, £12,664 (£13,117).

Beyer, Peacock & Company—Profit for 1942, after charging taxation and contingencies, £65,240 (£75,387); depreciation, £13,500 (same); net profit, £38,008 (£51,283); forward, £56,112 (£18,104).

Bairds & Scottish Steel—Profit for 1942, after providing for taxation, depreciation, contingencies, war damage contributions, etc., £78,730 (£80,287); ordinary dividend of 5% (same); forward, £70,746 (£65,516).

Incledon & Lamberts—Net profit for the year to March 31, £13,720 (£13,299); dividend of 10% (same) on the preference shares, £1,587; ordinary dividend of 12½% (same), £10,641; to reserve, £1,500; forward, £487 (£495).

North British Locomotive—Profit for 1942, after depreciation, £228,349 (£220,409); tax, £150,000 (£120,000); reserve, £50,000 (same); preference dividend, £18,750; ordinary dividend of 3% (nil); forward, £50,146 (£59,296).

Burntisland Shipbuilding—Profit to March 31, after E.P.T. and war damage, £68,753 (£67,355); depreciation, £15,000 (£10,000); income-tax, £27,000 (£21,500); to reserve, £15,000 (same); dividend of 13% (same); forward, £39,973 (£38,970).

Cape Asbestos—Profit for 1942, before provision for E.P.T. and income-tax, in respect of which £111,500 (£35,000) has been set aside to the reserve, £169,209 (£93,521); dividends of 1½% on the ordinary shares and 17½% on the preference (same).

Rheostatic Company—Profit for year to September 30 last, after making provision for depreciation, income-tax, N.D.C., and E.P.T., £8,071 (£7,100); to general reserve, £2,500 (£2,000); dividend of 12% (10%) on the ordinary stock, £4,200 (£3,500); forward, £4,055 (£4,184).

Wilkes Berger Engineering—Net profit for 1942, £62,845 (£35,894); reduction of reserve in respect of subsidiary, £7,200 (£5,500); taxation, £53,340 (£19,227); preference capital redemption reserve, £3,200; ordinary dividend of 15% (same), with bonus of 2½% (nil); forward, £17,253 (£14,935).

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Pumps & Compressors, 133, Regent Street, London, W.1—£1,000.

George Bisset & Son, 24, Mearns Street, Aberdeen—Structural engineers, etc. £40,000.

Burgoyne Engineering Company—£5,000. L. Tobias, 58, Margaret Street, London, W.1, subscriber.

Swerco Welding Services, 47, Eyre Lane, Sheffield—£1,000. W. J. Edgar, H. Turner, and F. Beaumont.

Broadway Metal Works, 56-58, Gordon Road, Hornsey, London, N.8—£3,000. F. Titze and E. Roberts.

Foundry Tools, 33, St. James's Street, London, S.W.1—£1,000. I. Lunn, E. Andersen and R. S. Yates.

J. T. Barker & Sons, 13, Dawson Street, Leeds—Engineers, ironfounders, etc. £1,000. J. T. and M. G. Barker.

Rusholme Engineering Company, 44, Brazennose Street, Manchester—£1,000. J. M. Rogers and W. Fowlie.

Sutton Benger Engineering Company, 1, South Parade, Bath—£5,000. W. H. Sheppard and F. D. Barrow.

North London Heat Treatment, 14, Parson Street, Hendon, London, N.W.4—£1,000. W. C. Challen and S. H. Knight.

Manygate Engineering Company, 11, Paradise Road, Richmond, Surrey—£5,000. P. H. L. and H. L. Davis and E. F. Wood.

Allbon Engineering Company (Sunbury), 6, Warwick Court, Gray's Inn, London, W.C.1—£5,000. J. and A. S. Allbon.

Standard Foundry (C. Jones), Beehive Works, 73, Watery Lane, Birmingham, 9—£3,000. C. and A. Jones and H. B. Wallis.

Preston & Fylde Engineering Company, Dock Works, Carnarvon Road, Preston—£3,500. T. W. Whipp and F. Gardner.

Daniel Varney—Engineers, metallurgists, research workers, etc. £10,000. R. Witt, 16, Old Broad Street, London, E.C.2, subscriber.

Faraday & Watt, 49, Queen Victoria Street, London, E.C.4—Dealers in machinery, tools and accessories, etc. £1,000. H. S. Stocks and R. Moore.

William Sugden & Company (Leeds), Marshalls Mills, Back Derwent Street, Leeds, 11—Iron and steel merchants. £3,000. W. and J. Sugden Marshall.

H. E. Carder & Company, 19, Lower High Street, Wednesbury, Staffs—General engineers, agents and factors. £2,000. H. E. Carder and S. T. Bishop.

MINISTRY OF SUPPLY

WHY
TYRES MUST BE SUBMITTED FOR REPLACEMENT WHEN SMOOTH

SUBMIT NOW FOR REPLACEMENT

This tyre can be re-treaded—with less than half the rubber needed to make a new tyre.

100% DEAD LOSS

as a tyre. This tyre is worn beyond repair, it can never be retreaded.

★ To run tyres with the fabric showing is now a punishable offence.

RUBBER IS SCARCE
TAKE MORE CARE OF YOUR TYRES

Raw Material Markets

IRON AND STEEL

There is plenty of high-phosphorus iron to meet all requirements—although the rate of absorption has naturally been on a slightly better scale—but the continued scarcity of low- and medium-phosphorus iron is an embarrassment only partly relieved by the extended use of refined iron and scrap. Indeed, an accelerated output of refined iron still falls short of the demand and these considerations will no doubt impel the freer import of North African ores as soon as military exigencies and transport facilities permit.

It is known that considerable quantities of high-grade ore have been accumulated at North African ports. Quite large tonnages have already been shipped, but makers and users of special qualities of iron would appreciate much bigger supplies. Developments in the Mediterranean may soon facilitate these shipments.

The foundry coke supply position continues to be very satisfactory, with ample tonnages available for both current and forward requirements. Stocks have been accumulated at consuming points where the necessary accommodation is available.

Notwithstanding an expansion in the home production of steel semis, it has not been possible to maintain full-scale activities at the re-rolling mills without the consumption of limited tonnages of American billets and more particularly sheet bars. Hence the relief expressed in industrial circles here that the stoppage of production in the American coal mines has been of brief duration. Even the momentary interruption of fuel supplies had exercised an adverse influence on American steel production, and any prolongation of the stoppage would have had repercussions on the steel situation in this country. In the finished steel trade pressure for steel plates is particularly brisk. Special priority is accorded to shipbuilders, who are also substantial users of sheets. There are, however, big demands for boiler and tank plates which must be given consideration in the allocations for the third period. There seems no likelihood of any substantial increase in the call for heavy joists, but light and medium sections are wanted for a wide variety of purposes.

NON-FERROUS METALS

The keynote in all non-ferrous metals continues to be that of economy of consumption. For essential purposes adequate supplies are forthcoming and it would appear that this will be so for the duration of the war, but ordinary domestic consumers are receiving very little metal on account of the need to conserve shipping space for more vital cargoes. The authorities are constantly reviewing the situation in the light of developments in the utilisation of non-ferrous metals for war purposes and negotiate where necessary for the shipment of additional supplies.

According to an American report, shipments of high-grade and intermediate grades of zinc from the U.S.A. to the United Kingdom under the Lease-Lend arrangements were discontinued as from April 1. They are being replaced with more than double the quantity of low-grade zinc shipped during the preceding quarter. This change was requested by the British Government and reflects a change in the armament programme in the United Kingdom.

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

552,359 TRIGGS, W. W. (Pittsburgh Steel Company). Selective multiple feed device for rolling mill.

552,370 TRIGGS, W. W. (Niles-Bement-Pond Company). Totalisers for rolling mills.

552,390 BRITISH CAST IRON RESEARCH ASSOCIATION. MORGAN, E., and HINCHLIFFE, E. Manufacture of iron castings.

552,400 MCDONALD, J., and G.W.B. ELECTRIC FURNACES, LIMITED. Furnaces.

552,430 COSWAY, R., and IMPERIAL CHEMICAL INDUSTRIES, LIMITED. Apparatus for degreasing metal and like non-absorbent articles.

552,457 ADAMS, G. Apparatus for separating dust and like impurities from air and gases.

552,465 MADISON-KIPP CORPORATION. Machines for casting metals.

552,522 TELICHOWSKI, T. Casting of metals.

552,552 GROVES, W. W. (Wright, F. L., and Luerssen, G. V.). Steel alloy.

552,558 HITCHCOCK, S. I. Permanent magnets.

552,569 PYRENE COMPANY, LIMITED (Parker Rust-Proof Company). Production of coatings on ferrous surfaces.

552,579 CHERRY-BURRELL CORPORATION. Chain or conveyor links.

552,631 FORD MOTOR COMPANY, LIMITED. Moulds for casting molten metal.

552,637 FORD MOTOR COMPANY, LIMITED, RENSHAW, E. S., and HARTNETT, J. V. Process for melting metals.

552,674 MAGNESIUM ELEKTRON, LIMITED, and BUSHROD, C. J. Inhibition of corrosion of magnesium and magnesium base alloys.

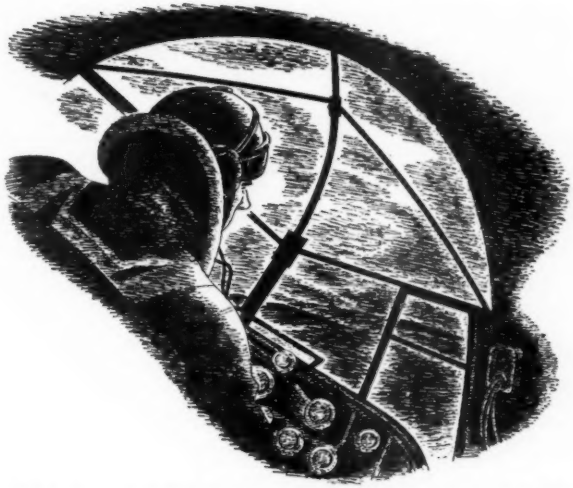
552,675 KAPELLA, LIMITED, and REASON, R. E. Apparatus for measuring or indicating the shape of a surface or the degree of roughness thereof.

552,696 WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY. Tensile testing machines.

552,748 GRENE, G. H. S., and WILD-BARFIELD ELECTRIC FURNACES, LIMITED. Metallurgical processes and to furnaces therefor.

552,777 HIGH DUTY ALLOYS, LIMITED, HERON, J. A., and HOCKING, L. N. Continuous casting of metal billets, bars, rods, tubes and the like.

552,857 BRITISH BUNDY TUBING COMPANY, LIMITED (Bundy Tubing Company). Method of and apparatus for bending metal tubes.



USE YOUR BLACK-OUT TO BEAT THE BOMBER

—don't let it beat you too—

Black-out atmosphere — overheated, unventilated air — undermines operatives' energy and enthusiasm, slows down effort and affects production. Health suffers. Unless efficient ventilation is installed the black-out will beat you. Consult the G.E.C., whose ventilation engineers will give expert advice on ventilation equipment specially designed for black-out conditions.

CONSULT THE G.E.C. ON VENTILATION

with GENALEX EXHAUST FANS

VENTILATION BY GENALEX FANS

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2 Gen. 14

CURRENT PRICES OF IRON, STEEL AND NON-FERROUS METALS

(Delivered, unless otherwise stated)

Wednesday, June 16, 1943

PIG-IRON

Foundry Iron.—CLEVELAND No. 3: Middlesbrough, 128s.; Birmingham, 130s.; Falkirk, 128s.; Glasgow, 131s.; Manchester, 133s. DERBYSHIRE No. 3: Birmingham, 130s.; Manchester, 133s.; Sheffield, 127s. 6d. NORTHANTS No. 3: Birmingham, 127s. 6d.; Manchester, 131s. 6d. STAFFS No. 3: Birmingham, 130s.; Manchester, 133s. LINCOLNSHIRE No. 3: Sheffield, 127s. 6d.; Birmingham, 130s.

(*No. 1 foundry 3s. above No. 3. No. 4 forge 1s. below No. 3 for foundries, 3s. below for ironworks.*)

Hematite.—No. 1 (S & P 0.03 to 0.05 per cent.): Scotland, N.-E. Coast and West Coast of England, 138s. 6d.; Sheffield, 144s.; Birmingham, 150s.; Wales (Welsh iron), 134s. East Coast No. 3 at Birmingham, 149s.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, 140s. 6d., delivered Birmingham.

Scotch Iron.—No. 3 foundry, 124s. 9d.; No. 1 foundry 127s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, 174s.; South Zone, 176s. 6d.

Refined Malleable.—North Zone, 184s.; South Zone, 186s. 6d.

Cold Blast.—South Staffs, 227s. 6d.

(NOTE.—*Prices of hematite pig-iron, and of foundry and forge iron with a phosphoric content of not less than 0.75 per cent., are subject to a rebate of 5s. per ton.*)

FERRO-ALLOYS

(Per ton unless otherwise stated, basis 2-ton lots, d/d Sheffield works.)

Ferro-silicon (5-ton lots): 25 per cent., £21 5s.; 45 per cent., £23 10s.; 75 per cent., £36 10s.

Ferro-vanadium.—35/50 per cent., 15s. 6d. per lb. of V.

Ferro-molybdenum.—70/75 per cent., carbon-free, 6s. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, 1s. 3½d. lb.

Ferro-tungsten.—80/85 per cent., 9s. 8d. lb.

Tungsten Metal Powder.—98/99 per cent., 9s. 9½d. lb.

Ferro-chrome.—4/6 per cent. C, £44; max. 2 per cent. C, 1s. 0½d. lb.; max. 1 per cent. C, 1s. 1½d. lb.; max. 0.5 per cent. C, 1s. 1½d. lb.

Cobalt.—98/99 per cent., 8s. 9d. lb.

Metallic Chromium.—96/98 per cent., 4s. 5d. lb.

Ferro-manganese.—78/98 per cent., £18 10s.

Metallic Manganese.—94/96 per cent., carb.-free, 1s. 9d. lb.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms and Slabs.—BASIC: Soft, u.t., 100-ton lots, £12 5s.; tested, up to 0.25 per cent. C, £12 10s.; hard (0.42 to 0.60 per cent. C), £13 17s. 6d.; silico-manganese, £17 5s.; free-cutting, £14 10s. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £15 15s.; case-hardening, £16 12s. 6d.; silico-manganese, £17 5s.

Billets, Blooms and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £13 17s. 6d.; basic hard, 0.42 to 0.60 per cent. C, £14 10s. 6d.; acid, up to 0.25 per cent. C, £16 5s.

Sheet and Tinplate Bars.—£12 2s. 6d., 6-ton lots.

FINISHED STEEL

[*A rebate of 15s. per ton for steel bars, sections, plates, joists and hoops is obtainable in the home trade under certain conditions.*]

Plates and Sections.—Plates, ship (N.-E. Coast), £16 3s.; boiler plates (N.-E. Coast), £17 0s. 6d.; chequer plates (N.-E. Coast), £17 13s.; angles, over 4 un. ins., £15 8s.; tees, over 4 un. ins., £16 8s., joists, 3 in. × 3 in. and up, £15 8s.

Bars, Sheets, etc.—Rounds and squares, 3 in. to 5½ in., £16 18s.; rounds, under 3 in. to ¾ in. (untested), £17 12s.; flats, over 5 in. wide, £15 13s.; flats, 5 in. wide and under, £17 12s.; rails, heavy, f.o.t., £14 10s. 6d.; hoops, £18 7s.; black sheets, 24 g. (4-ton lots), £22 15s.; galvanised corrugated sheets (4-ton lots), £26 2s. 6d.; galvanised fencing wire, 8g. plain, £26 17s. 6d.

Tinplates.—I.C. cokes, 20 × 14 per box, 29s. 9d., f.o.t. makers' works, 30s. 9d., f.o.b.; C.W., 20×14, 27s. 9d., f.o.t., 28s. 6d., f.o.b.

NON-FERROUS METALS

Copper.—Electrolytic, £62; high-grade fire-refined, £61 10s.; fire-refined of not less than 99.7 per cent., £61; ditto, 99.2 per cent., £60 10s.; black hot-rolled wire rods, £65 10s.

Tin.—99 to under 99.75 per cent., £275; 99.75 to under 99.9 per cent., £276 10s.; min. 99.9 per cent., £278 10s.

Spelter.—G.O.B. (foreign) (duty paid), £25 15s.; ditto (domestic), £26 10s.; "Prime Western," £26 10s.; refined and electrolytic, £27 5s.; not less than 99.99 per cent., £28 15s.

Lead.—Good soft pig-lead (foreign) (duty paid), £25; ditto (Empire and domestic), £25; English, £26 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, ex works, £37 12s. 6d.; rolled zinc (boiler plates), ex works, £35 12s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £30 10s.

Other Metals.—Aluminium, ingots, £110; antimony, English, 99 per cent., £120; quicksilver, ex warehouse, £68 10s. to £69 15s.; nickel, £190 to £195.

Brass.—Solid-drawn tubes, 14d. per lb.; brazed tubes, 16d.; rods, drawn, 11¾d.; rods, extruded or rolled, 9d.; sheets to 10 w.g., 10¾d.; wire, 10¾d.; rolled metal, 10¾d.; yellow metal rods, 9d.

Copper Tubes, etc.—Solid-drawn tubes, 15½d. per lb.; brazed tubes, 15½d.; wire, 10d.

Phosphor Bronze.—Strip, 13¾d. per lb.; sheets to 10 w.g., 14¾d.; wire, 16d.; rods, 16d.; tubes, 21½d.; castings, 19d., delivery 3 cwt. free. 10 per cent. phos. cop. £35 above B.S.; 15 per cent. phos. cop. £43 above B.S.; phosphor tin (5 per cent.) £40 above price of English ingots. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 10d. to 1s. 4d. per lb.; rolled to 9 in. wide, 1s. 4d. to 1s. 10d.; to 12 in. wide, 1s. 4½d. to 1s. 10½d.; to 15 in. wide, 1s. 4½d. to 1s. 10½d.; to 18 in. wide, 1s. 5d. to 1s. 11d.; to 21 in. wide, 1s. 5½d. to 1s. 11½d.; to 25 in. wide, 1s. 6d. to 2s. Ingots for spoons and forks, 10d. to 1s. 6½d. Ingots rolled to spoon size, 1s. 1d. to 1s. 9½d. Wire round, to 10g., 1s. 7½d. to 2s. 2½d., with extras according to gauge. Special 5ths quality turning rods in straight lengths, 1s. 6½d. upwards.

NON-FERROUS SCRAP

Controlled Maximum Prices.—Bright untinned copper wire, in crucible form or in hanks, £57 10s.; No. 1 copper wire, £57; No. 2 copper wire, £55 10s.; copper firebox plates, cut up, £57 10s.; clean untinned copper, cut up, £56 10s., braziery copper, £53 10s.; Q.F. process and shell-case brass, 70/30 quality, free from primers, £49; clean fired 303 S.A. cartridge cases, £47; 70/30 turnings, clean and baled, £43; brass swarf, clean, free from iron and commercially dry, £34 10s.; new brass rod ends, 60/40 quality, £38 10s.; hot stampings and fuse metal, 60/40 quality, £38 10s.; Admiralty gunmetal, 88-10-2, containing not more than ½ per cent. lead or 3 per cent. zinc, or less than 9½ per cent. tin, £74 10s., all per ton. ex works.

Returned Process Scrap.—(Issued by the N.F.M.C. as the basis of settlement for returned process scrap, week ended June 12, where buyer and seller have not mutually agreed a price; net, per ton, ex-sellers' works, suitably packed):—

Brass.—S.A.A. webbing, £48 10s.; S.A.A. defective cups and cases, £47 10s.; S.A.A. cut-offs and trimmings, £42 10s.; S.A.A. turnings (loose), £37; S.A.A. turnings (baled), £42 10s.; S.A.A. turnings (masticated), £42; Q.F. webbing, £49; defective Q.F. cups and cases, £49; Q.F. cut-offs, £47 10s.; Q.F. turnings, £38; other 70/30 process and manufacturing scrap, £46 10s.; process and manufacturing scrap containing over 62 per cent. and up to 68 per cent. Cu, £43 10s.; ditto, over 58 per cent. to 62 per cent. Cu, £38 10s.; 85/15 gilding metal webbing, £52 10s.; 85/15 gilding defective cups and envelopes before filling, £50 10s.; cap metal webbing, £54 10s.; 90/10 gilding webbing, £53 10s.; 90/10 gilding defective cups and envelopes before filling, £51 10s.

Cupro Nickel.—80/20 cupro-nickel webbing, £75 10s.; 80/20 defective cups and envelopes before filling, £70 10s.

Nickel Silver.—Process and manufacturing scrap: 10 per cent. nickel, £50; 15 per cent. nickel, £56; 18 per cent. nickel, £60; 20 per cent. nickel, £63.

Copper.—Sheet cuttings and webbing, untinned, £54; shell-band plate scrap, £56 10s.; copper turnings, £48.

IRON AND STEEL SCRAP

(*Delivered free to consumers' works. Plus 3¾ per cent. dealers' remuneration. 50 tons and upwards over three months, 2s. 6d. extra.*)

South Wales.—Short heavy steel, not ex. 24-in. lengths, 82s. to 84s. 6d.; heavy machinery cast iron, 87s.; ordinary heavy cast iron, 82s.; cast-iron railway chairs, 87s.; medium cast iron, 78s. 3d.; light cast iron, 73s. 6d.

Middlesbrough.—Short heavy steel, 79s. 9d. to 82s. 3d. heavy machinery cast iron, 91s. 9d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 89s. 3d.; medium cast iron, 79s. 6d.; light cast iron, 74s. 6d.

Birmingham District.—Short heavy steel, 74s. 9d. to 77s. 3d.; heavy machinery cast iron, 92s. 3d.; ordinary heavy cast iron, 87s. 6d.; cast-iron railway chairs, 87s. 6d.; medium cast iron, 80s. 3d.; light cast iron, 75s. 3d.

Scotland.—Short heavy steel, 79s. 6d. to 82s.; heavy machinery cast iron, 94s. 3d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 94s. 3d.; medium cast iron, 77s. 3d.; light cast iron, 72s. 3d.

(Note.—*For deliveries of cast-iron scrap free to consumers' works in Scotland, the above prices less 3s. per ton, but plus actual cost of transport or 6s. per ton, whichever is the less.*

WILLIAM JACKS & COMPANY LIMITED
WINCHESTER HOUSE, OLD BROAD ST., LONDON, E.C.2.
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PIG REGISTERED TRADE MARK CUMBRIA IRON
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15 RUMFORD STREET, LIVERPOOL.

NOTICE

Small Advertisements in this section of the Journal are accepted at the *prepaid* rate of 2d. per word in ordinary type and 3d. per word in capitals.

Minimum charge for one insertion 4/-.

Instructions for these advertisements, accompanied by a remittance, are accepted up to FIRST POST WEDNESDAY MORNING for insertion in the current week's issue. All communications to be addressed to the Advertisement Manager, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe, Bucks. The Proprietors reserve the right to refuse any advertisement they consider unsuitable.

SITUATIONS VACANT AND WANTED

FOUNDRY MANAGER (37), M.I.B.F., desires change, with post-war prospects; handling approx. 300 male and female; competent; metals, general engineering, all types pump and compressor castings; sound knowledge moulding machines and modern production methods.—Box 878, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

PRACTICAL Iron Foundry Foreman desires change; over 20 years' experience as Head Foreman; highest references.—Box 882, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

INDIAN ORDNANCE INSPECTION SECTION.

The Ministry of Labour and National Service invite applications for appointment as ASSISTANT INSPECTORS (two) in the Inspectorate of Metal and Steel in India.

Appointments will be for the duration of the war, with a minimum period of one year, subject to three months' notice on either side. Salary—the equivalent of £840 per annum, rising by £45 per annum, to £1,020 per annum.

Free passage both ways is provided. Bonus on termination of service.

Candidates should have good general education and possess Metallurgist Degree or metallurgical equivalent, and at least five and preferably ten years' general metallurgical process control experience in an engineering works.

Consideration will be given to applications from candidates not possessing full qualifications if their experience renders them particularly suitable for appointment.

Application, in writing, should be made to the MINISTRY OF LABOUR AND NATIONAL SERVICE, Central (Technical and Scientific) Register, Alexandra House, Kingsway, London, W.C.2, quoting O.N.F. 1,325.

EMPLOYMENT REGISTER.

Correspondence should be addressed to the General Secretary, Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester, from whom full particulars can be obtained of this service.

FOUNDRY WORKS MANAGER; 17 years' executive experience, machine tools and internal combustion engines; estimating, costing and organisation; casting of mechanised plants; age 45. (449)

MACHINERY

WANTED.—100 ft. Gravity Roller Conveyor; about 16 in. wide.—"WARWILL," LTD., Abertillery.

2 "ACME" Sand-Drying Stoves, for coke firing; 2 ft. 4 in. long by 2 ft. 6 in. wide by 3 ft. 6 in. high.—Apply: NEWMAN, HENDER & Co., LTD., Woodchester, Glos.

VERTICAL Steam Boiler; 8 ft. 6 in. by 4 ft.; insured 100 lbs.; insured and tested last month with all fittings. Three Steel Tanks; 14 ft. long, 8 ft. wide, 3 ft. 6 in. deep; ¼ in. plate; in good condition.—PORRITT, Mayfield, Leeds Road, Mirfield. Tel.: 3218.

THOS. W. WARD LTD.

5-cwt. Massey Steam Hammer; distance centre ram to frame 2 ft.
20-cwt. Massey Arch Type Steam Hammer.
10-cwt. Massey Arch Type Steam Hammer.
3-cwt. Massey Arch Type Steam Hammer.
Battery of Drop Stamps; 30 cwt., 15 cwt. capacity; by Massey.
Craven Billet Parting Off Machine; capacity 5 ft.; arranged for motor drive, with motor for 220 volts d.c.
Unused 45 in., Type 13 KB, High Efficiency Motor-Driven Steelplate Fan; 6,000 cub. ft./m.; 13 in. s.w.g.; motor wound for 400 volts, 3-phase, 50 cycles.
We are authorised dealers under Licence No. 151 from the Ministry of Supply.
Write for "Albion" Catalogue.
ALBION WORKS, SHEFFIELD.
'Grams: "Forward." 'Phone: 26311 (15 lines).

FOR SALE.—One 6-ft. dia. rotating pan Sand Mill; one 5 ft. 4 in. by 4 ft. 4 in. Osborne Rollover Jolt Moulding Machine; 20 pairs 2 ft. 7 in. by 2 ft. 5 in. by 5 in. Sterling Steel Moulding Boxes, as new.—Box 898, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

PNEUMATIC MOULDING MACHINES.

Tabor (Macnab) Vert. turnover. table approx. 40 in. by 30 in.
Tabor, 21 in. by 16-in. squeeze.
Adaptable Rollover Core - Making Machines, hand operated.
Mumford Type (Jackman) Swing Headpress, 13 in. by 15 in.
Mumford Pneumatic Core Jolters, tables 24 in. by 18 in.
Britannia No. 1 "Coventry" Turnover Jar Ram, table 30 in. by 28 in.
Universal Plain Jolt; 1-ton capacity; table 37½ in. square; one machine unused.
Sandblasting Plant; 50 Air Compressors; 500 Electric Motors, Dynamos, etc.

S. C. BILSBY,
CROSSWELLS ROAD, LANGLEY,
NR. BIRMINGHAM.
Broadwell 1359.

FOR SALE.—One 10 h.p. Squirrel Cage Motor, by Brook; 960 revs., 400 volts, 3-phase, 50 periods; complete with two Slides and one Star Delta starter; in good running order; price £20, plus carriage.—Box 888, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

MISCELLANEOUS

LEADING GREY IRON FOUNDRY has capacity for repetition castings; reasonable (not cut) prices, and excellent delivery.—Box 890, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

FOUNDERS, with capacity for repetition Brass and/or Bronze Castings, required for important war contracts.—Please write Box 896, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

CAPACITY FOR REPETITION MALLEABLE CASTINGS; large quantities only; reasonable prices; excellent delivery.—Box 892, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

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We're the largest stockists. We've got what you want. WE DON'T WANT TO MAKE MONEY OUT OF MATERIAL—WORK IS OUR BREAD AND BUTTER. We're now booking for the fourth week in January, 1944. Is that when you want your job done? Please note we're at Beds and Cambs. Going—60 ft. of 30-in. S/H Chimney.—ESERIN (STEEPLEJACKS), LTD., 7, Gt. Castle Street, W.1. Langham 2914.

MOULDING BOARDS and other Foundry Requirements in wood.—Immediate delivery from W. J. HOOKER, 73, Cotswold Gardens, London, N.W.2. Gladstone 3474.

FOR SALE.—Four Tons Wire; suitable for core making.—PORRITT, Mayfield, Leeds Road, Mirfield. Tel.: 3218.

FOR SALE.—FOUNDRY CORE-DRYING PLATES; 3/16 in. thick, width 10½ in. (a limited quantity of 9½ in. wide); any length up to 48 in.; price, 12s. 6d. per cwt., f.o.b.—Box 754, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

PATTERNS for all branches of Engineering, for Hand or Machine Moulding.—FURNESTON & LAWLOR, Letchworth.

'Phone: 22877 SLOUGH

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5 Ton Pneulec Cupola with electric fan.
Macdonald 60"×40" Rollover jolter.
Macdonald 40"×24" Rollover jolter.
Air Compressors, all sizes.
Electric Motors, all sizes.
Ladles, all sizes.
Rubber gloves for shotblasting.

NEW SHOT BLAST CABINET PLANTS with motor driven Exhaust Fans, complete, all sizes; air compressors to suit in stock, also motors if required.

Alex. Hammond, *Foundry Machinery Merchant.*
14 AUSTRALIA Rd. SLOUGH
BUY FROM ME AND SAVE MONEY

ABRASIVE WHEELS

for High and Normal Speeds . . .

HIGH SPEED ELECTRICALLY DRIVEN DRY GRINDERS
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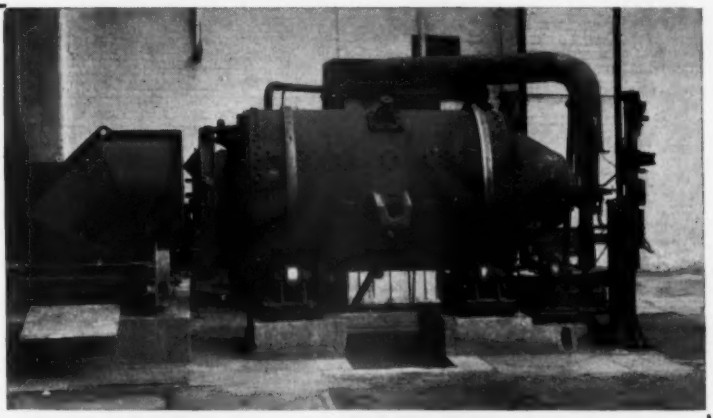

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FOUNDRY TRADE JOURNAL

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